# Master's Project Presentation


Sam Barrett, 1803086

University of Birmingham

October 27, 2020

# My Topic

## Applications of Genetic Algorithms on Fully Autonomous Road Networks

- Semi-autonomous vehicles are becoming more prevalent
- Roads are becoming more congested
- Fully autonomous vehicle trials have been legal in parts of the US since 2015[1], with the UK set to follow by next year (2021)[3]
- Much of the current research into autonomous vehicle routing focuses on environments where human drivers are still present
- By removing the human element and working on theoretical *fully autonomous road networks* we can make many useful assumptions about the behaviour of other vehicles

# Literature Review

# Methods

## Language Choice

Not final but preliminary implementations have used Julia[2]

- C-like performance
- Python & Matlab -like syntax
- Matlab like matrices
- Allows for both OO and functional approaches to problems
- Allows for use of Unicode in variable & function names so implementations of advanced mathematical expressions are much more readable

```julia
function Σ(xs)
    ret = 0
    for x in xs
        ret += x
    end
    ret
end

xs = [1,2,3]

Σ(xs) == reduce(+,xs) #True
```

Figure: Example Julia code

Alternatives include Rust and Python3
Python3:

- Simple syntax
- Wealth of stress-tested libraries
- Slow relative to alternatives
- unable to compile to binary format
- Has some functional capabilities
- Has some static typing ability

Rust:

- Slower to prototype in as stricter type system to guarantee memory safety
- Very performant

# References



Autonomous Vehicles — Self-Driving Vehicles Enacted Legislation.
https://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx.


The Julia Programming Language.
https://julialang.org/.


UK wants fully autonomous cars on road.
*BBC News*, Feb. 2019.